



# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: XE500T1C



FCC ID: A3LXE500T1C & A3LXE500T1CN

Industry Canada Certification Number: 649E-XE500T1C & 649E-XE500T1CN

To: FCC Part 15.247: 2011 Subpart C, RSS-210 Issue 8 December 2010  
& RSS-Gen Issue 3 December 2010

**Test Report Serial No.:**  
RFI-RPT-RP89958JD05A V2.0

**Version 2.0 supersedes all previous versions**

<b>This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:</b>		
<b>Checked By:</b>	Steven White	
<b>Signature:</b>		
<b>Date of Issue:</b>	02 October 2012	

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**1. Customer Information**












<b>Company Name:</b>	Samsung Electronics Co., Ltd.
<b>Address:</b>	416, Maetan-3Dong, Yeongtong-Gu, Suwon-City, Gyeonggi-Do, 443-742, Korea

## 2. Summary of Testing

### 2.1. General Information

<b>Specification Reference:</b>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Section 15.247
<b>Specification Reference:</b>	47CFR15.107 and 47CFR15.109
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
<b>Specification Reference:</b>	47CFR15.207 and 47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
<b>Specification Reference:</b>	RSS-Gen Issue 3 December 2010
<b>Specification Title:</b>	General Requirements and Information for the Certification of Radio Apparatus
<b>Specification Reference:</b>	RSS-210 Issue 8 December 2010
<b>Specification Title:</b>	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
<b>Site Registration:</b>	FCC: 209735; Industry Canada: 3245B-2
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	21 August 2012 to 25 August 2012

### 2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.107(a)	RSS-Gen 7.2.4	Receiver/Idle Mode AC Conducted Emissions	
Part 15.109	RSS-Gen 4.10	Receiver/Idle Mode Radiated Spurious Emissions	
Part 15.207	RSS-Gen 7.2.4	Transmitter AC Conducted Emissions	
Part 15.247(a)(2)	RSS-Gen 4.6.2 RSS-210 A8.2(a)	Transmitter 6 dB Bandwidth	
N/A	RSS-Gen 4.6.1	Transmitter Occupied Bandwidth	
Part 15.247(e)	RSS-210 A8.2(b)	Transmitter Power Spectral Density	
Part 15.247(b)(3)	RSS-Gen 4.8 RSS-210 A8.4(4)	Transmitter Maximum Peak Output Power	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Radiated Emissions	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Band Edge Radiated Emissions	
<b>Key to Results</b>			
 = Complied  = Did not comply			

### **2.3. Methods and Procedures**

<b>Reference:</b>	ANSI C63.4 (2009)
<b>Title:</b>	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
<b>Reference:</b>	ANSI C63.10 (2009)
<b>Title:</b>	American National Standard for Testing Unlicensed Wireless Devices
<b>Reference:</b>	KDB 558074 D01 v01 1/18/2012
<b>Title:</b>	Guidance for Performing Compliance Measurements on Digital Transmission System (DTS) devices operating Under §15.247

### **2.4. Deviations from the Test Specification**

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

### **3. Equipment Under Test (EUT)**

#### **3.1. Identification of Equipment Under Test (EUT)**

<b>Brand Name:</b>	Samsung
<b>Model Name or Number:</b>	XE500T1C
<b>Serial Number:</b>	HX2W91SC700004R (Radiated sample)
<b>Hardware Version Number:</b>	PV
<b>Software Version Number:</b>	Window OS
<b>FCC ID:</b>	A3LXE500T1C
<b>FCC ID:</b>	A3LXE500T1CN
<b>Industry Canada Certification Number:</b>	649E-XE500T1C
<b>Industry Canada Certification Number:</b>	649E-XE500T1CN

<b>Brand Name:</b>	Samsung
<b>Model Name or Number:</b>	XE500T1C
<b>Serial Number:</b>	HX2W91SC700031T (Conducted sample RF port)
<b>Hardware Version Number:</b>	PV
<b>Software Version Number:</b>	Window OS
<b>FCC ID:</b>	A3LXE500T1C
<b>FCC ID:</b>	A3LXE500T1CN
<b>Industry Canada Certification Number:</b>	649E-XE500T1C
<b>Industry Canada Certification Number:</b>	649E-XE500T1CN

<b>Brand Name:</b>	Chicony
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	A12-040N1A
<b>Serial Number:</b>	CNS440001595DON825J00RA

#### **3.2. Description of EUT**

The equipment under test was a Tablet PC with *Bluetooth* and IEEE 802.11a,b,g,n operating in the 2.4 GHz and 5 GHz bands.

#### **3.3. Maximum Output Power**

Frequency Range (MHz)	Mode	Conducted Output Power (dBm)
5725 MHz to 5850 MHz	802.11a	16.1
5725 MHz to 5850 MHz	802.11n	16.2

#### **3.4. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

**3.5. Additional Information Related to Testing**

<b>Technology Tested:</b>	IEEE 802.11a,b,g,n / Digital Transmission System		
<b>Type of Unit:</b>	Transceiver		
<b>Modulation:</b>	BPSK, QPSK, 16QAM, 64QAM		
<b>Data rates:</b>	802.11a	6, 9, 12, 18, 24, 36, 48 & 54 Mbps	
	802.11n	6.5, 13, 19.5, 26, 39, 52, 58.5 & 65 Mbps	
<b>Power Supply Requirement(s):</b>	Nominal	12 VDC via 120 VAC 60 Hz adaptor	
<b>Maximum Conducted Output Power:</b>	16.2 dBm		
<b>Antenna Gain</b>	2.45 dBi		
<b>Channel Spacing:</b>	20 MHz		
<b>Transmit / Receive Frequency Range:</b>	5725 MHz to 5850 MHz		
<b>Transmit / Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	149	5745
	Middle	157	5785
	Top	165	5825

### **3.6. Support Equipment**

The following support equipment was used to exercise the EUT during testing:

<b>Description:</b>	USIM
<b>Brand Name:</b>	Comprion
<b>Model Name or Number:</b>	Micro USIM

<b>Description:</b>	SD RAM
<b>Brand Name:</b>	San Disk
<b>Model Name or Number:</b>	8 GB

<b>Description:</b>	USB Hub
<b>Brand Name:</b>	Belkin
<b>Model Name or Number:</b>	F5U404-BLK
<b>Serial Number:</b>	D12-00047182

<b>Brand Name:</b>	Not stated
<b>Description:</b>	Micro USB to USB cable
<b>Model Name or Number:</b>	Not stated

<b>Brand Name:</b>	Not stated
<b>Description:</b>	HDMI cable
<b>Model Name or Number:</b>	Not stated

<b>Description:</b>	Cyclone Micro Media Player Adaptor
<b>Brand Name:</b>	Sumvision
<b>Model Name or Number:</b>	Cyclone Micro
<b>Serial Number:</b>	RFI Asset No. A1986

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating mode(s):

- Continuously transmitting at maximum power on the bottom, middle and top channels as required using the supported data rates/modulation schemes.
- Receive/Idle mode.

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

- The EUT supports 20 MHz channel bandwidth only. The Customer has declared the worst case data rates as:
  - 802.11a: 6 Mbps.
  - 802.11n: 6.5 Mbps / MCS0.
- Controlled using a bespoke application on the EUT, by pressing sequence of buttons on the front panel display which placed the unit into test mode. The application was used to enable continuous transmission and receive mode and to select the test channels, data rates and modulation schemes as required.
- Receive/Idle tests: The 802.11 mode was active but not transmitting.
- Transmitter spurious emissions were performed with the EUT transmitting with a data rate of 6.5 Mbps (MCS0) with a channel bandwidth of 20 MHz, as this was found to have the highest power level and therefore deemed to be worst case.
- Radiated emissions tests were performed with all unused ports terminated.

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6 Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

## **5.2. Test Results**

### **5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	23 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Part 15.107(a)
<b>Industry Canada Reference:</b>	RSS-Gen 7.2.4
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	45

#### **Results: Live / Quasi Peak**

<b>Frequency (MHz)</b>	<b>Line</b>	<b>Level (dB<math>\mu</math>V)</b>	<b>Limit (dB<math>\mu</math>V)</b>	<b>Margin (dB)</b>	<b>Result</b>
0.155	Live	51.0	65.8	14.8	Complied
0.168	Live	51.5	65.1	13.6	Complied
0.222	Live	42.0	62.7	20.7	Complied
14.361	Live	24.6	60.0	35.4	Complied
16.899	Live	32.3	60.0	27.7	Complied
19.280	Live	31.3	60.0	28.7	Complied

**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.164	Live	37.9	55.3	17.4	Complied
0.168	Live	33.3	55.1	21.8	Complied
0.267	Live	28.4	51.2	22.8	Complied
14.028	Live	18.6	50.0	31.4	Complied
14.276	Live	23.3	50.0	26.7	Complied
19.284	Live	28.4	50.0	21.6	Complied

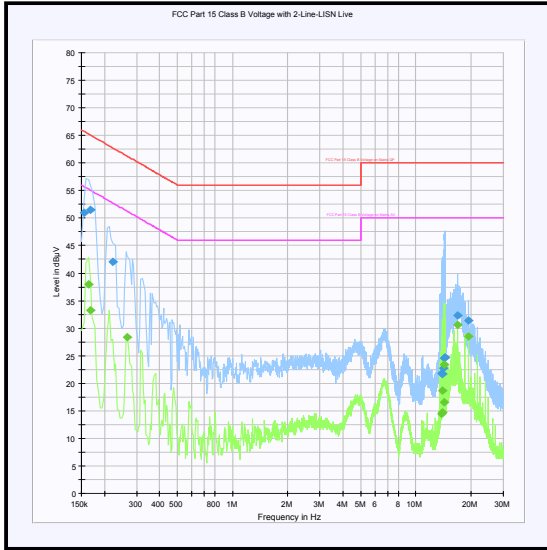
**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.159	Neutral	52.1	65.5	13.4	Complied
0.168	Neutral	50.3	65.1	14.8	Complied
0.222	Neutral	40.7	62.7	22.0	Complied
14.267	Neutral	25.1	60.0	34.9	Complied
14.388	Neutral	26.6	60.0	33.4	Complied
17.025	Neutral	38.9	60.0	21.1	Complied

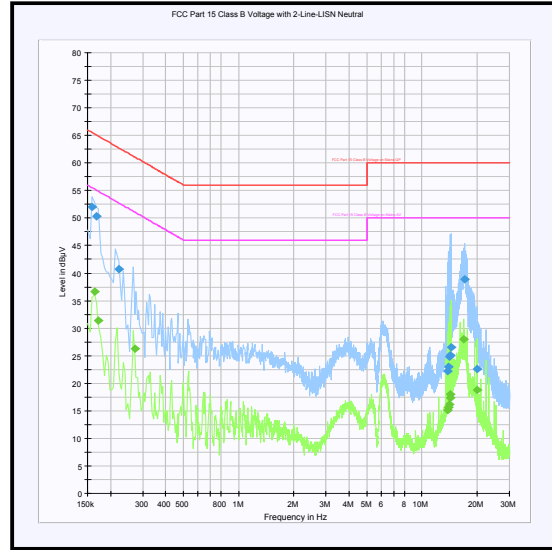
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.164	Neutral	36.6	55.3	18.7	Complied
0.173	Neutral	31.3	54.8	23.5	Complied
0.272	Neutral	26.2	51.1	24.9	Complied
14.357	Neutral	17.9	50.0	32.1	Complied
16.962	Neutral	28.0	50.0	22.0	Complied
20.058	Neutral	18.7	50.0	31.3	Complied

**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**



**Live**



**Neutral**

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
M1263	EMI Test Receiver	ESIB 7	04 Apr 2013	12
A1830	Pulse Limiter	ESH3-Z2	25 Feb 2013	12
A649	Single Phase LISN	ESH3-Z5	19 Feb 2013	12

**5.2.2. Receiver/Idle Mode Radiated Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	21 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Part 15.109
<b>Industry Canada Reference:</b>	RSS-Gen 4.10
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	29
<b>Relative Humidity (%):</b>	35

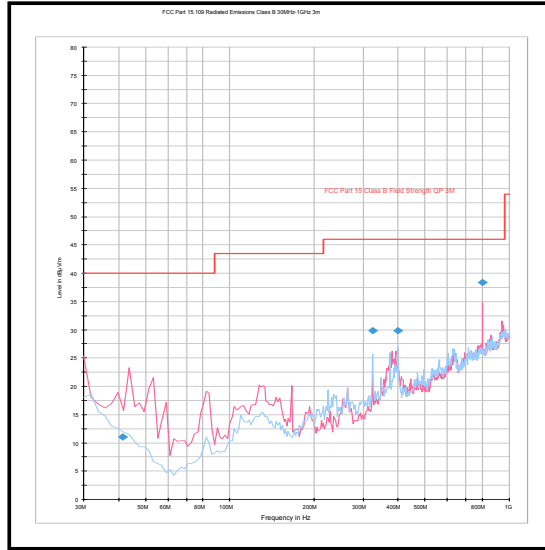
**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

**Results: Quasi Peak**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Level (dB<math>\mu</math>V/m)</b>	<b>Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
41.486	Vertical	11.1	40.0	28.9	Complied
324.484	Horizontal	29.9	46.0	16.1	Complied
399.372	Horizontal	29.8	46.0	16.2	Complied
798.745	Vertical	38.3	46.0	7.7	Complied

**Receiver/Idle Mode Radiated Spurious Emissions (continued)**



*Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.*

**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0001	5 m Semi-Anechoic Chamber	N/A	31 Aug 2012	12
M1273	Test Receiver	ESIB 26	03 Feb 2013	12
A1834	Attenuator	8491B	29 Jan 2013	12
G0543	Amplifier 9KHz - 1GHz	310N	15 Oct 2012	12
A553	Bi-log Antenna	CBL6111A	15 Feb 2013	12

**Receiver/Idle Mode Radiated Spurious Emissions (continued)****Test Summary:**

<b>Test Engineer:</b>	Nick Steele & Andrew Edwards	<b>Test Date:</b>	22 August 2012 & 24 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Part 15.109
<b>Industry Canada Reference:</b>	RSS-Gen 4.10
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range:</b>	1 GHz to 30 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	24 to 26
<b>Relative Humidity (%):</b>	41 to 48

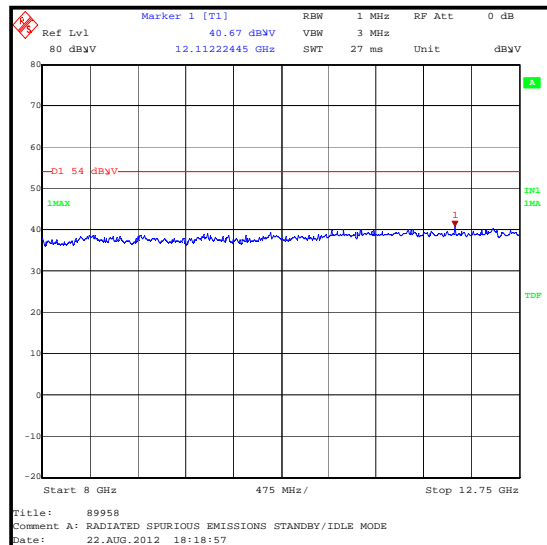
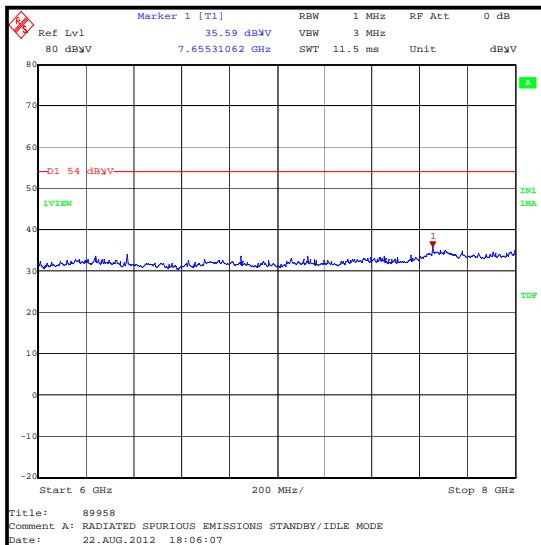
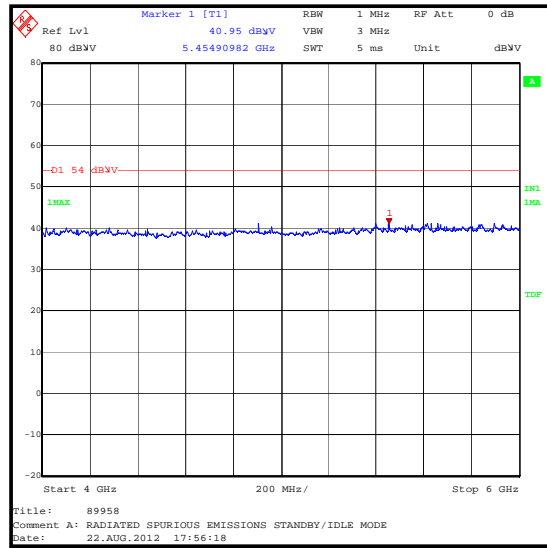
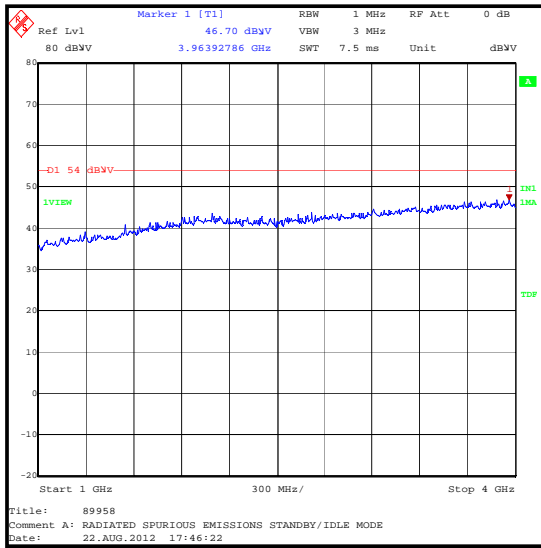
**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
3. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

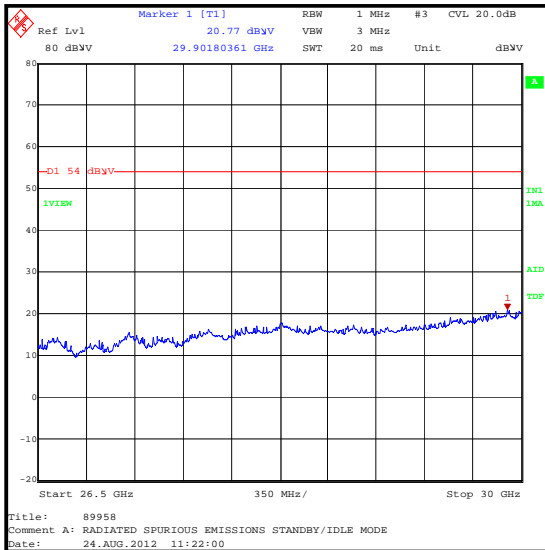
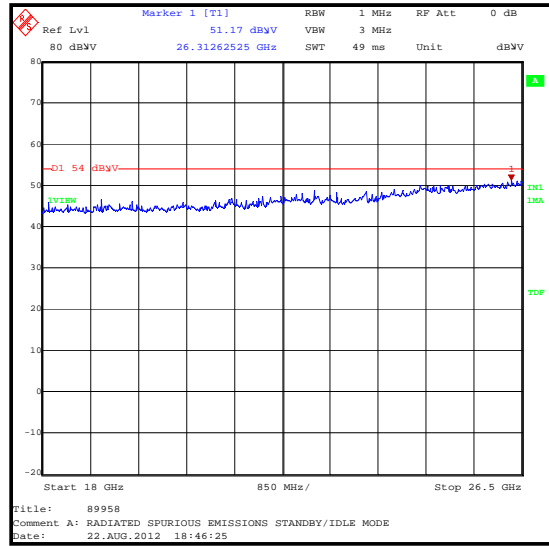
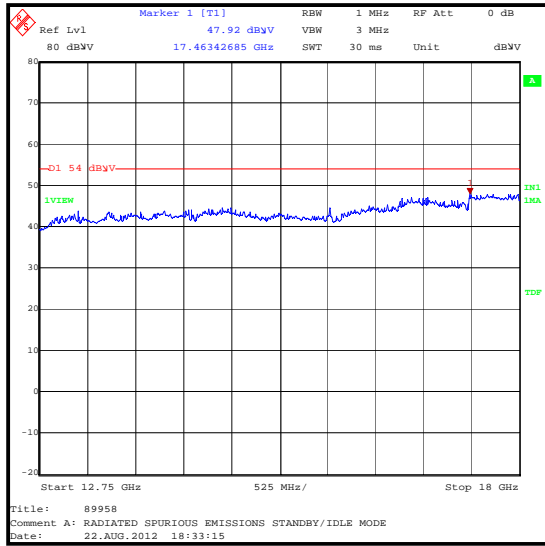
**Results:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Peak Level (dB<math>\mu</math>V/m)</b>	<b>Average Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
26312.625	Vertical	51.2	54.0	2.8	Complied

### Receiver/Idle Mode Radiated Spurious Emissions (continued)



### Receiver/Idle Mode Radiated Spurious Emissions (continued)



*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

**Receiver/Idle Mode Radiated Spurious Emissions (continued)****Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0002	3m RSE Chamber	N/A	09 Oct 2012	12
M1124	Test Receiver	ESIB 26	14 Aug 2013	12
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A1818	1-18GHz Horn Antenna	3115	09 Oct 2012	12
A253	WG 12 Microwave Horn	12240-20	09 Oct 2012	12
A254	WG 14 Microwave Horn	14240-20	09 Oct 2012	12
A255	WG 16 Microwave Horn	16240-20	09 Oct 2012	12
A256	WG 18 Microwave Horn	18240-20	09 Oct 2012	12
A436	WG 20 Microwave Horn	20240-20	09 Oct 2012	12
A203	WG 22 Microwave Horn	22240-20	11 May 2013	36
M1390	26.5 GHz to 40 GHz Harmonic Mixer	WHMP 28	Calibrated before use	-
A1785	26.5 GHz to 40 GHz Pre-amplifier	FLNA-28-30	Calibrated before use	-
A366	Isolator	FRR-400	Calibrated before use	-
S0537	DC Power Supply Unit	EL302D	Calibrate not required	-
M1269	Multimeter	179	30 Jul 2013	12

**5.2.3. Transmitter AC Conducted Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	23 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Part 15.207
<b>Industry Canada Reference:</b>	RSS-Gen 7.2.4
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	45

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Live	47.0	66.0	19.0	Complied
0.150	Live	47.0	66.0	19.0	Complied
15.014	Live	24.7	60.0	35.3	Complied
16.193	Live	23.9	60.0	36.1	Complied
17.214	Live	24.0	60.0	36.0	Complied

**Results: Live / Average/**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Live	29.8	56.0	26.2	Complied
0.168	Live	28.4	55.1	26.7	Complied
13.574	Live	22.3	50.0	27.7	Complied
14.357	Live	12.0	50.0	38.0	Complied
15.041	Live	15.0	50.0	35.0	Complied
16.229	Live	31.5	50.0	18.5	Complied

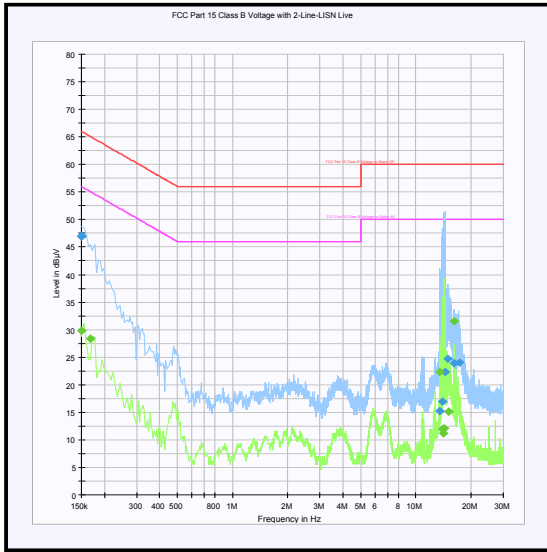
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	47.5	66.0	18.5	Complied
0.150	Neutral	47.5	66.0	18.5	Complied
14.375	Neutral	21.2	60.0	38.8	Complied
16.715	Neutral	29.2	60.0	30.8	Complied
16.962	Neutral	30.7	60.0	29.3	Complied
17.277	Neutral	29.1	60.0	30.9	Complied

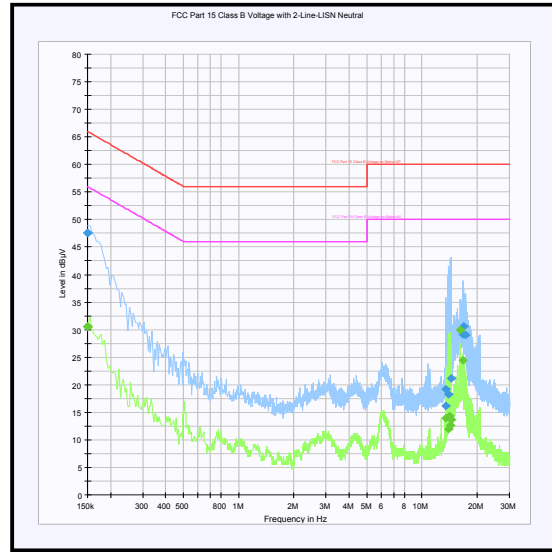
**Results: Neutral / Average /**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	30.6	56.0	25.4	Complied
0.150	Neutral	30.5	56.0	25.5	Complied
13.479	Neutral	14.0	50.0	36.0	Complied
14.078	Neutral	14.3	50.0	35.7	Complied
16.229	Neutral	30.0	50.0	20.0	Complied
16.778	Neutral	24.5	50.0	25.5	Complied

**Transmitter AC Conducted Spurious Emissions (continued)**



**Live**



**Neutral**

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
M1263	EMI Test Receiver	ESIB 7	04 Apr 2013	12
A1830	Pulse Limiter	ESH3-Z2	25 Feb 2013	12
A649	Single Phase LISN	ESH3-Z5	19 Feb 2013	12

**5.2.4. Transmitter 6 dB Bandwidth****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	21 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700031T		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>Industry Canada Reference:</b>	RSS-Gen 4.6.2, RSS-210 A8.2(a)
<b>Test Method Used:</b>	FCC KDB 55074 Section 5.1.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	42

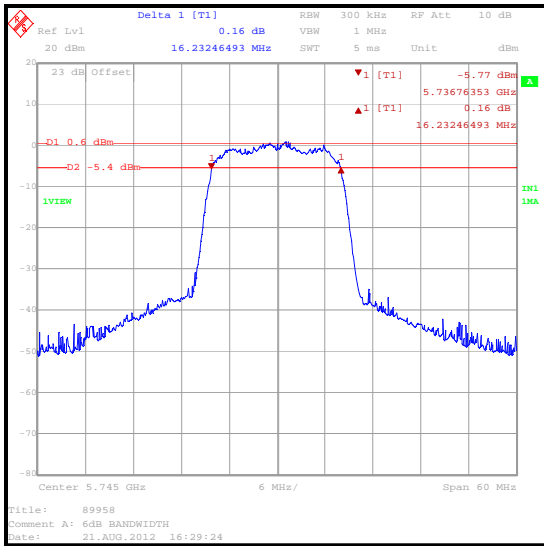
**Note(s):**

1. Measurements were performed on the worst case data rates declared by the customer.
  - o 802.11a: 6 Mbps.
  - o 802.11n: 6.5 Mbps / MCS0.

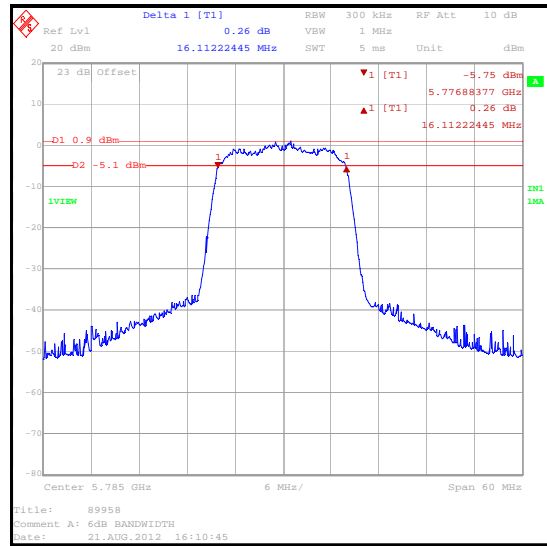
**Transmitter 6 dB Bandwidth (continued)**

**Results: 802.11a / 20 MHz / 6 Mbps / BPSK**

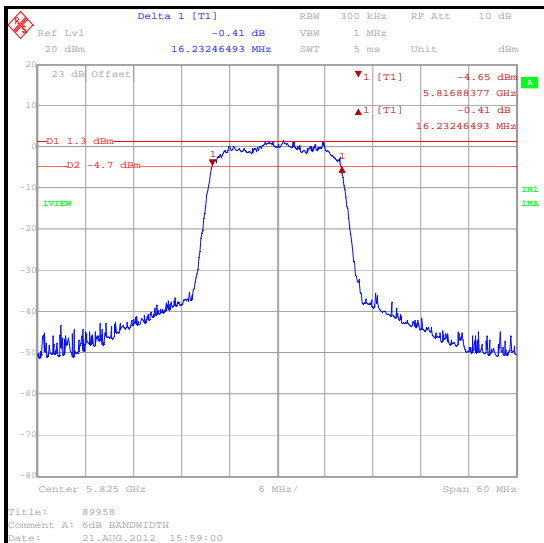
Channel	6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	16.232	≥0.5	15.732	Complied
Middle	16.112	≥0.5	15.612	Complied
Top	16.232	≥0.5	15.732	Complied



**Bottom Channel**



**Middle Channel**

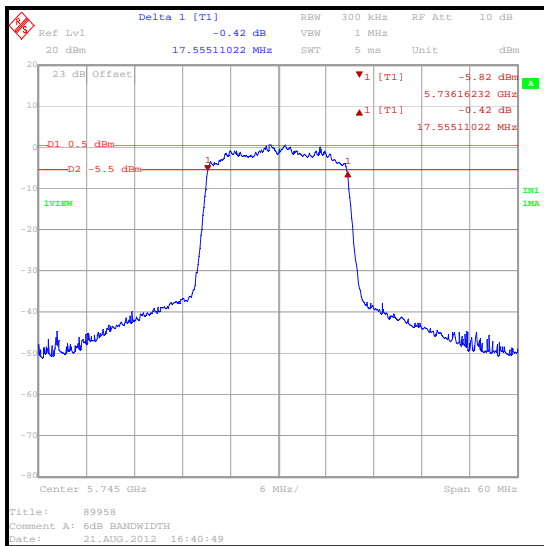


**Top Channel**

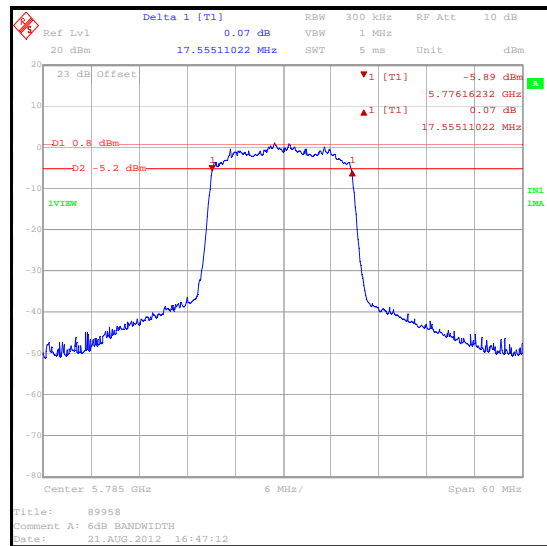
**Transmitter 6 dB Bandwidth (continued)**

**Results: 802.11n / 20 MHz / 6.5 Mbps / MCS0 / BPSK**

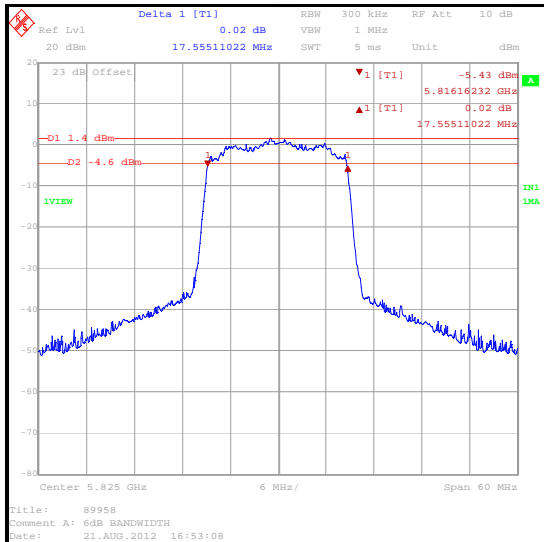
Channel	6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	17.555	≥0.5	17.055	Complied
Middle	17.555	≥0.5	17.055	Complied
Top	17.555	≥0.5	17.055	Complied



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter 6 dB Bandwidth (continued)****Test Equipment Used:**

<b>RFI ID</b>	<b>Instrument Description</b>	<b>Model Number</b>	<b>Calibration Due</b>	<b>Calibration Interval (Months)</b>
M1263	Test Receiver	ESIB 7	04 Apr 2013	12
A2142	Attenuator	AN18-20	25 May 2013	12

**5.2.5. Transmitter Occupied Bandwidth****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	21 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700031T		

<b>FCC Reference:</b>	N/A
<b>Industry Canada Reference:</b>	RSS-Gen 4.6.1
<b>Test Method Used:</b>	Tested using the occupied bandwidth function of a test receiver

**Environmental Conditions:**

<b>Temperature (°C):</b>	29
<b>Relative Humidity (%):</b>	43

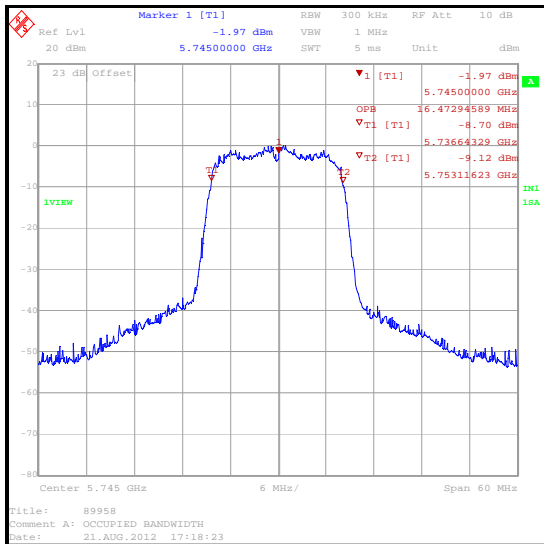
**Note(s):**

1. Occupied bandwidth (99% bandwidth) was measured using a test receiver occupied bandwidth function with the test receiver set to the appropriate bandwidth according to the channel width under test. Measurement bandwidths were set automatically by the test receiver.
2. Measurements were performed on the worst case data rates declared by the customer.
  - o 802.11a: 6 Mbps.
  - o 802.11n: 6.5 Mbps / MCS0.

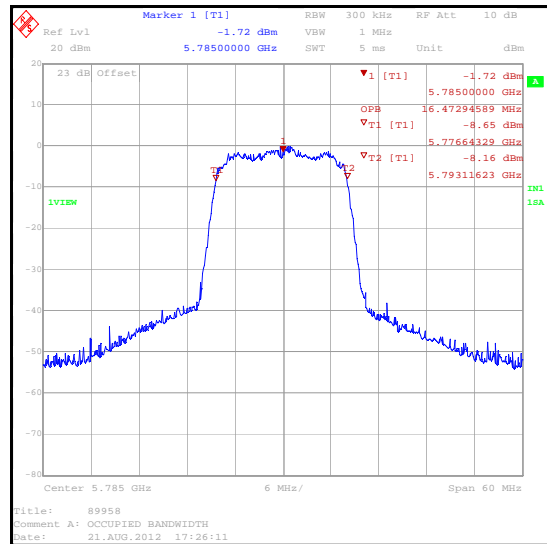
**Transmitter Occupied Bandwidth (continued)**

**Results: 802.11a / 20 MHz / 6 Mbps / BPSK**

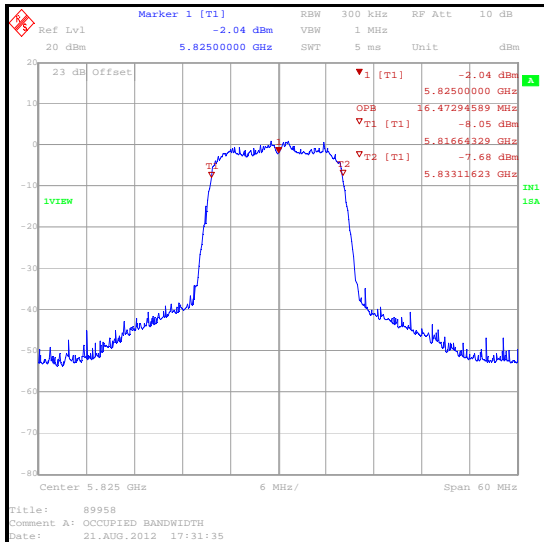
Channel	Occupied Bandwidth (MHz)
Bottom	16.473
Middle	16.473
Top	16.473



**Bottom Channel**



**Middle Channel**

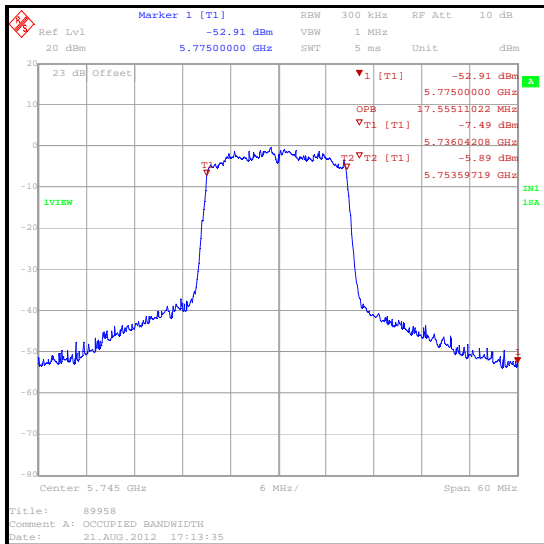


**Top Channel**

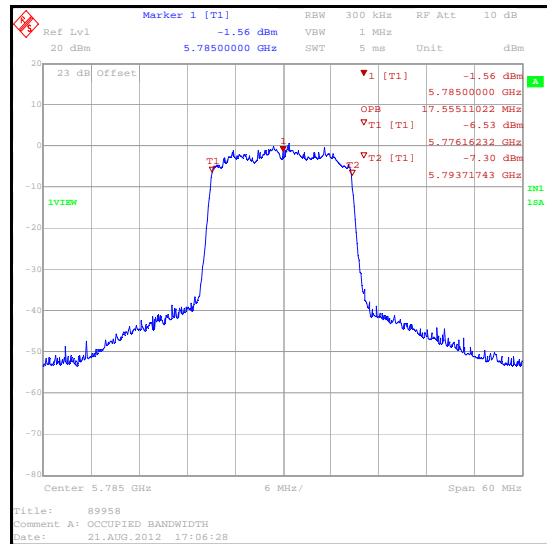
**Transmitter Occupied Bandwidth (continued)**

**Results: 802.11n / 20 MHz / 6.5 Mbps / MCS0 / BPSK**

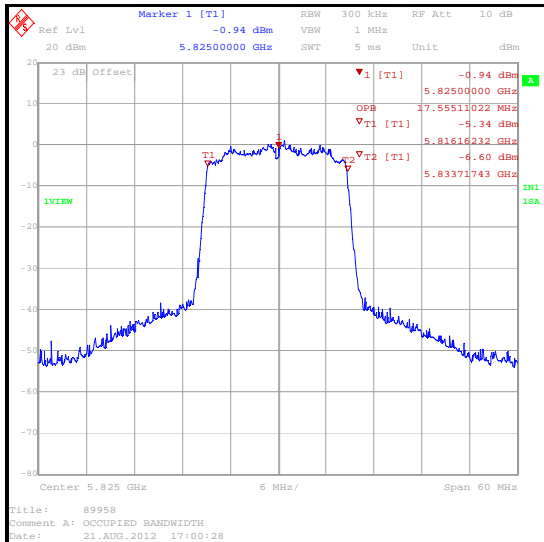
Channel	Occupied Bandwidth (MHz)
Bottom	17.555
Middle	17.555
Top	17.555



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Occupied Bandwidth (continued)****Test Equipment Used:**

<b>RFI ID</b>	<b>Instrument Description</b>	<b>Model Number</b>	<b>Calibration Due</b>	<b>Calibration Interval (Months)</b>
M1263	Test Receiver	ESIB 7	04 Apr 2013	12
A2142	Attenuator	AN18-20	25 May 2013	12

**5.2.6. Transmitter Power Spectral Density****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	21 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700031T		

<b>FCC Reference:</b>	Part 15.247(e)
<b>Industry Canada Reference:</b>	RSS-210 A8.2(b)
<b>Test Method Used:</b>	KDB 558074 Section 5.3.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	29
<b>Relative Humidity (%):</b>	42

**Note(s):**

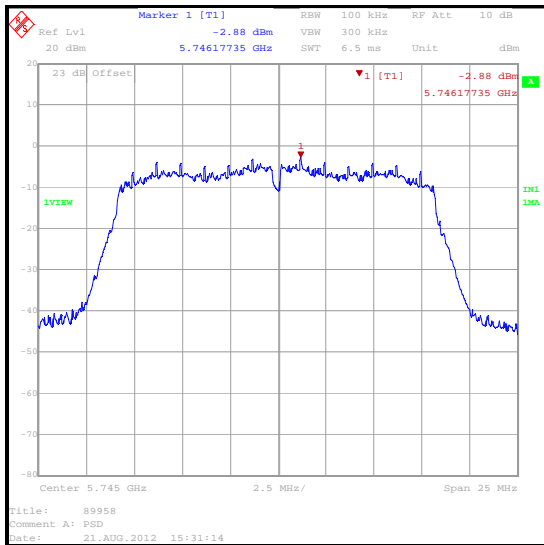
3. Transmitter Power Spectral Density tests in all bands were performed using a test receiver in accordance with FCC KDB 558074 Section 5.3.1 Measurement Procedure PKSPD.
4. Measurements were performed on the worst case data rates declared by the customer.
  - o 802.11a: 6 Mbps.
  - o 802.11n: 6.5 Mbps / MCS0.
5. A 20 dB attenuator and RF cable were used to connect the measurement equipment to the EUT. The combined cable and attenuator loss was measured prior to performing the measurements and the loss compensation incorporated into the measurement results.
6. The EUT was transmitting at 100% duty cycle.
7. In accordance with FCC KDB 558074 Section 5.3.1, the measurements were performed using a 100 kHz resolution bandwidth. A Band Width Correction Factor of 15.2 dB was then subtracted from the combined results to convert from a level measured in 100 kHz bandwidth as the limit is specified in a 3 kHz bandwidth. The correction factor (BWCF) was calculated as shown below:

$$10 \log_{10} (3 \text{ kHz} / 100 \text{ kHz}) = -15.2 \text{ dB}$$

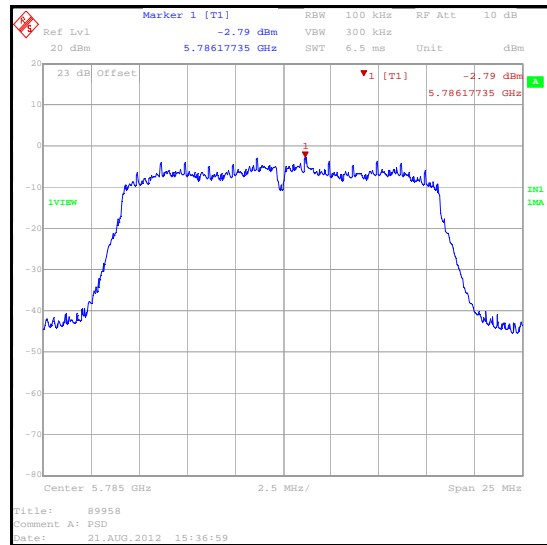
**Transmitter Power Spectral Density (continued)**

**Results: 802.11a / 20 MHz / 6 Mbps / BPSK**

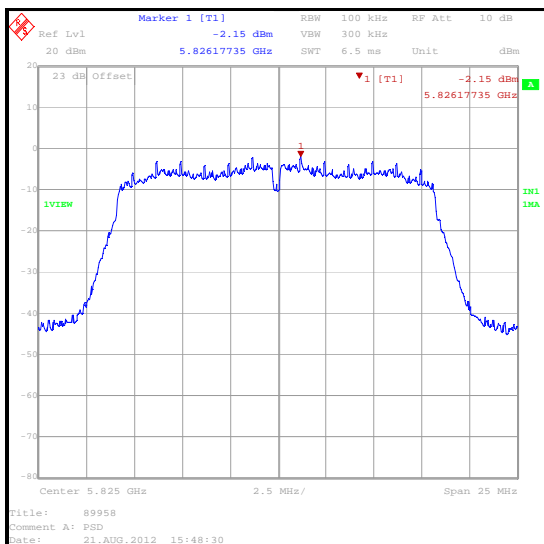
Channel	PSD (dBm / 100 kHz)	PSD (dBm / 3 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-2.9	-18.1	8.0	26.1	Complied
Middle	-2.8	-18.0	8.0	26.0	Complied
Top	-2.2	-17.4	8.0	25.4	Complied



**Bottom Channel**



**Middle Channel**

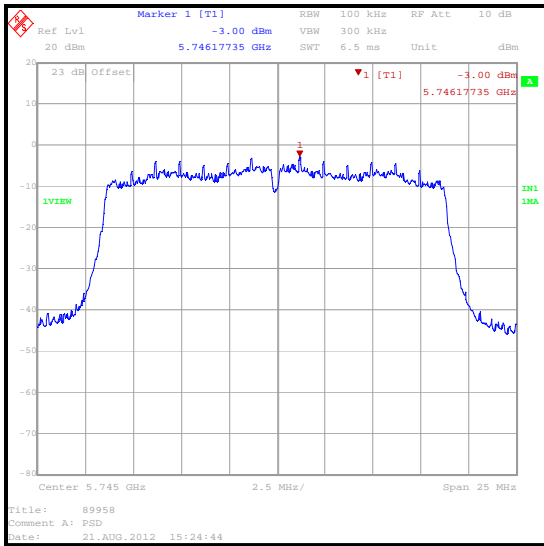


**Top Channel**

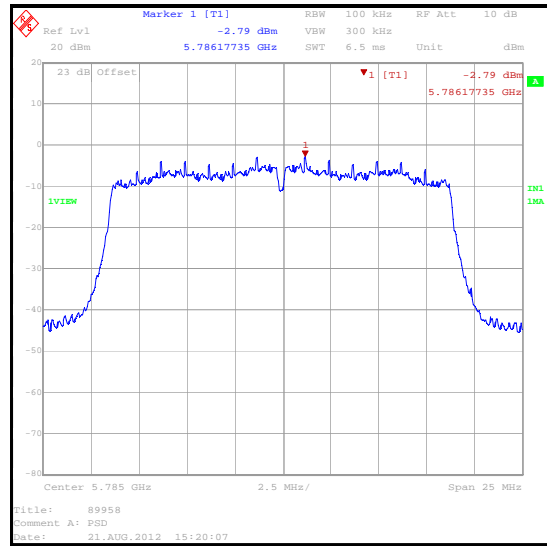
**Transmitter Power Spectral Density (continued)**

**Results: 802.11n / 20 MHz / 6.5 Mbps / BPSK / MCS0**

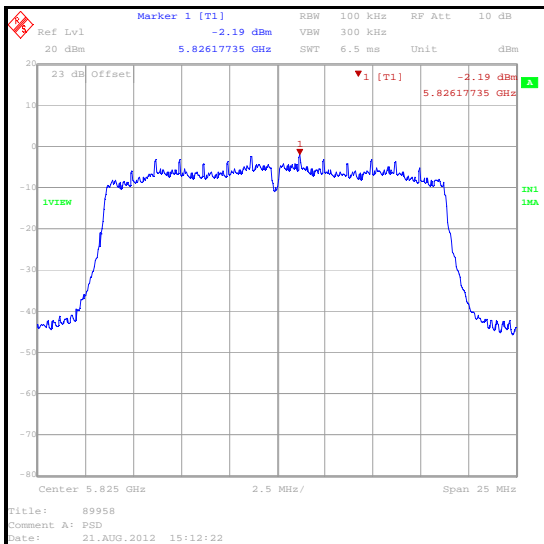
Channel	PSD (dBm / 100 kHz)	PSD (dBm / 3 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-3.0	-18.2	8.0	26.2	Complied
Middle	-2.8	-18.0	8.0	26.0	Complied
Top	-2.2	-17.4	8.0	25.4	Complied



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Power Spectral Density (continued)****Test Equipment Used:**

<b>RFI ID</b>	<b>Instrument Description</b>	<b>Model Number</b>	<b>Calibration Due</b>	<b>Calibration Interval (Months)</b>
M1263	Test Receiver	ESIB 7	04 Apr 2013	12
A2142	Attenuator	AN18-20	25 May 2013	12
M199	Power Meter	NRVS	07 Jun 2013	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
G085	10MHz - 50GHz CW Generator	83650L	09 Nov 2012	24

**5.2.7. Transmitter Maximum Peak Output Power****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	21 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700031T		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>Industry Canada Reference:</b>	RSS-Gen 4.8, RSS-210 A8.4(4)
<b>Test Method Used:</b>	KDB 558074 Section 5.2.1.2

**Environmental Conditions:**

<b>Temperature (°C):</b>	29
<b>Relative Humidity (%):</b>	42

**Note(s):**

1. Conducted power tests in all bands were performed using a test receiver in accordance with FCC KDB 558074 Section 5.2.1.2. Measurement Procedure PK2.
2. Measurements were performed on the worst case data rates declared by the customer.
  - o 802.11a: 6 Mbps.
  - o 802.11n: 6.5 Mbps / MCS0.
3. The combined cable and attenuator loss was measured prior to performing the measurements and the loss compensation incorporated into the measurement results.

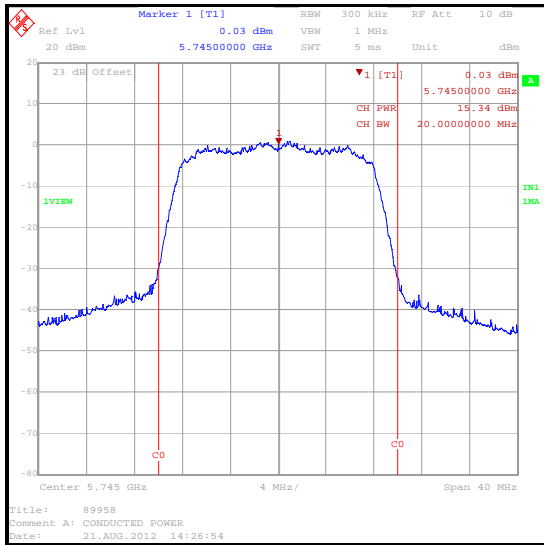
**Transmitter Maximum Peak Output Power (continued)****Results: 802.11a / 20 MHz / 6 Mbps / BPSK**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	15.3	30.0	14.7	Complied
Middle	15.5	30.0	14.5	Complied
Top	16.1	30.0	13.9	Complied

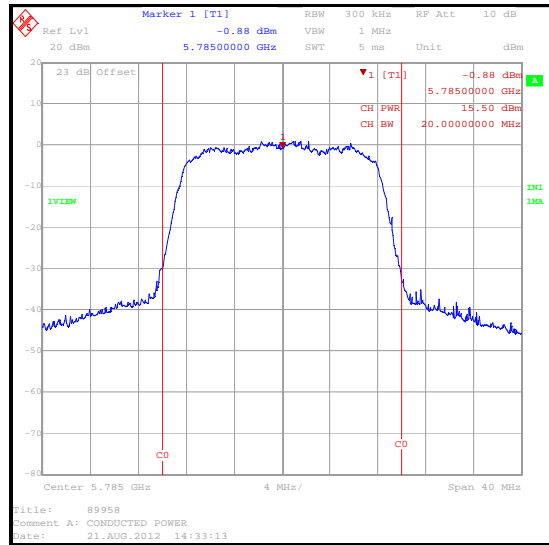
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	15.3	2.45	17.75	36.0	18.25	Complied
Middle	15.5	2.45	17.95	36.0	18.05	Complied
Top	16.1	2.45	18.55	36.0	17.45	Complied

**Transmitter Maximum Peak Output Power (continued)**

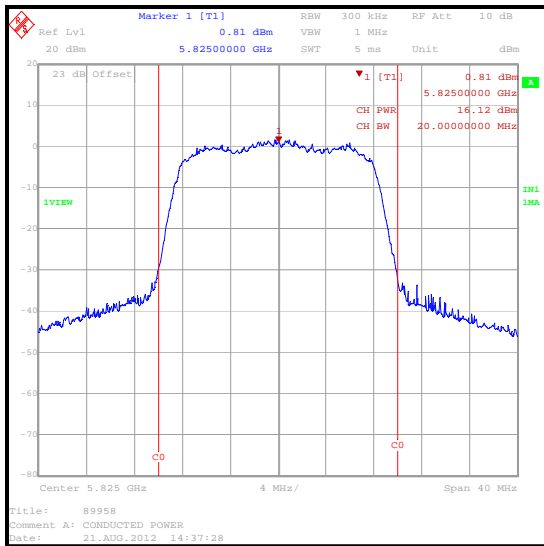
**Results: 802.11a / 20 MHz / 6 Mbps / BPSK**



**Bottom Channel**



**Middle Channel**



**Top Channel**

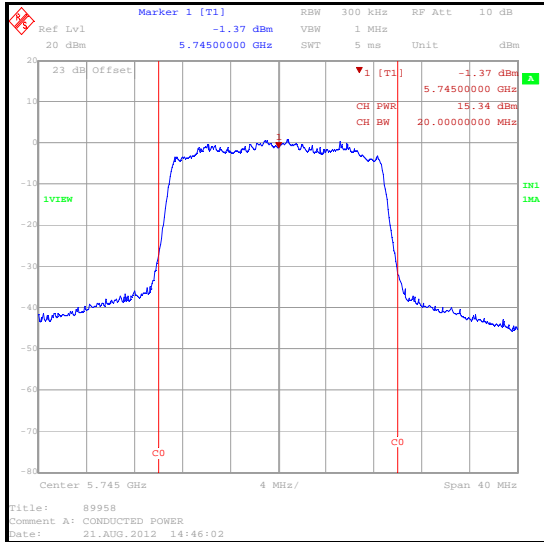
**Transmitter Maximum Peak Output Power (continued)****Results: 802.11n / 20 MHz / 6.5 Mbps / BPSK / MCS0**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	15.3	30.0	14.7	Complied
Middle	15.3	30.0	14.7	Complied
Top	16.2	30.0	13.8	Complied

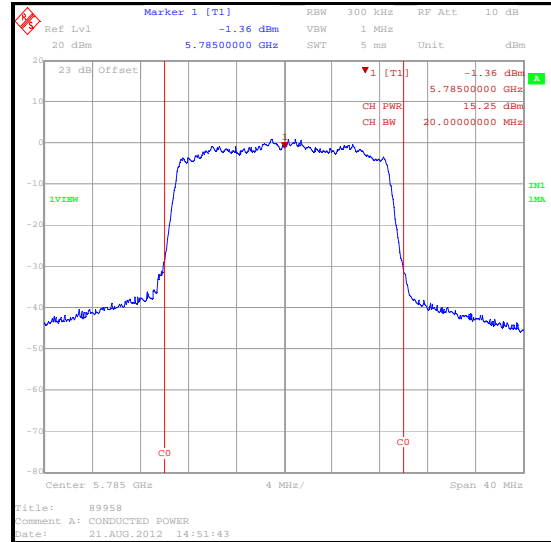
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	15.3	2.45	17.75	36.0	18.25	Complied
Middle	15.3	2.45	17.75	36.0	17.25	Complied
Top	16.2	2.45	18.65	36.0	17.35	Complied

**Transmitter Maximum Peak Output Power (continued)**

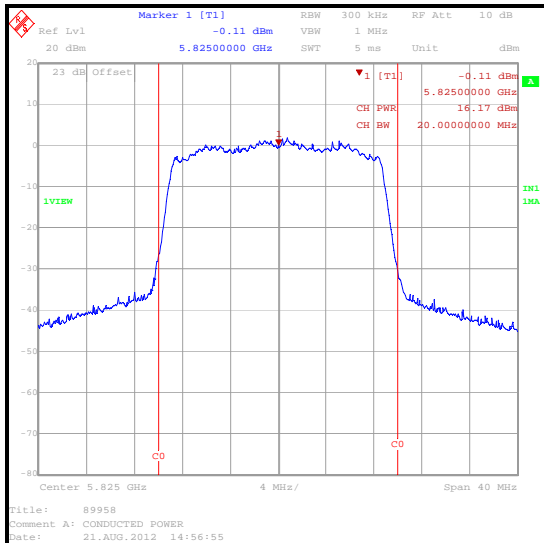
**Results: 802.11n / 20 MHz / 6.5 Mbps / BPSK / MCS0**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Maximum Peak Output Power (continued)****Test Equipment Used:**

<b>RFI ID</b>	<b>Instrument Description</b>	<b>Model Number</b>	<b>Calibration Due</b>	<b>Calibration Interval (Months)</b>
M1263	Test Receiver	ESIB 7	04 Apr 2013	12
A2142	Attenuator	AN18-20	25 May 2013	12
M199	Power Meter	NRVS	07 Jun 2013	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
G085	10MHz - 50GHz CW Generator	83650L	09 Nov 2012	24

**5.2.8. Transmitter Radiated Emissions****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	25 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Industry Canada Reference:</b>	RSS-Gen 4.9, RSS-210 A8.5
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

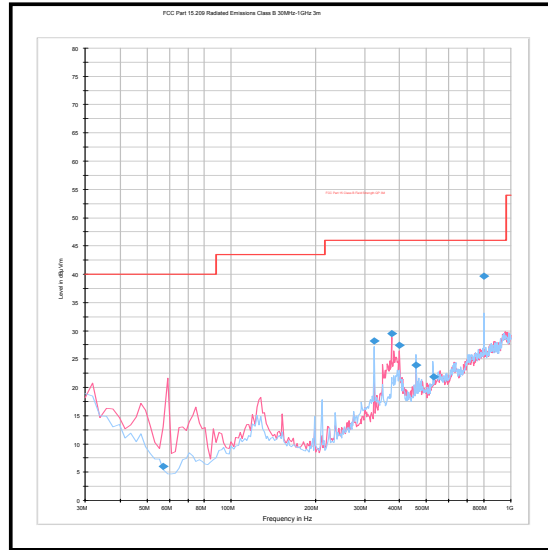
<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	47

**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the top channel only.
3. All other emissions were at least 20 dB below the appropriate limit or below the noise floor of the measurement system.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

**Results: Top Channel / 802.11n / 20 MHz / 6.5 Mbps / BPSK / MCS0**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
324.484	Horizontal	28.2	46.0	17.8	Complied

**Transmitter Radiated Emissions (continued)**

*Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.*

**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0001	5 m Semi-Anechoic Chamber	N/A	31 Aug 2012	12
M1273	Test Receiver	ESIB 26	03 Feb 2013	12
A1834	Attenuator	8491B	29 Jan 2013	12
G0543	Amplifier 9KHz - 1GHz	310N	15 Oct 2012	12
A553	Bi-log Antenna	CBL6111A	15 Feb 2013	12

**Transmitter Radiated Emissions (continued)****Test Summary:**

<b>Test Engineer:</b>	Nick Steele & Andrew Edwards	<b>Test Date:</b>	22 August 2012 & 24 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Industry Canada Reference:</b>	RSS-Gen 4.9, RSS-210 A8.5
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range</b>	1 GHz to 40 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	24 to 26
<b>Relative Humidity (%):</b>	41 to 48

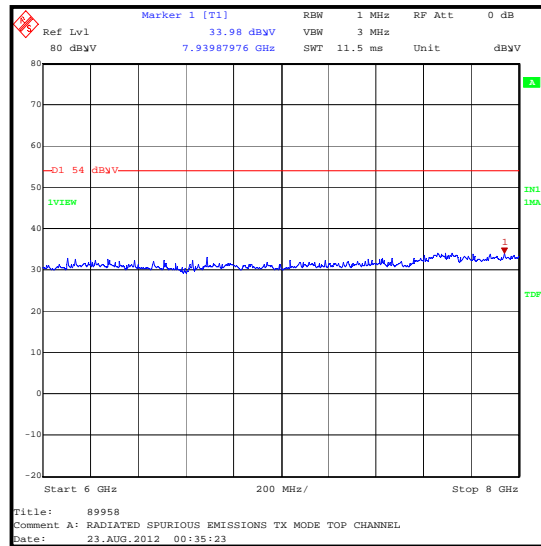
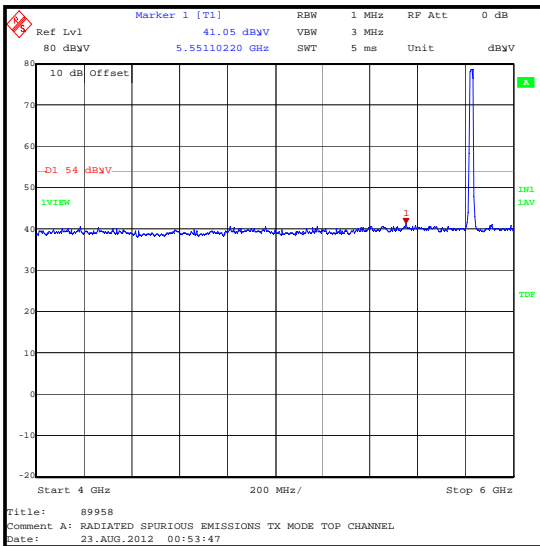
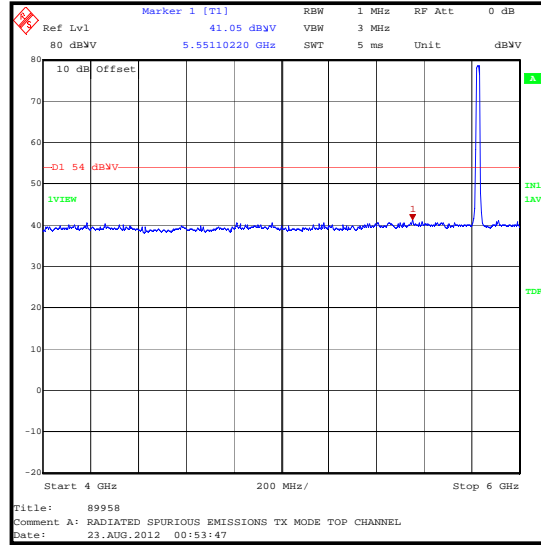
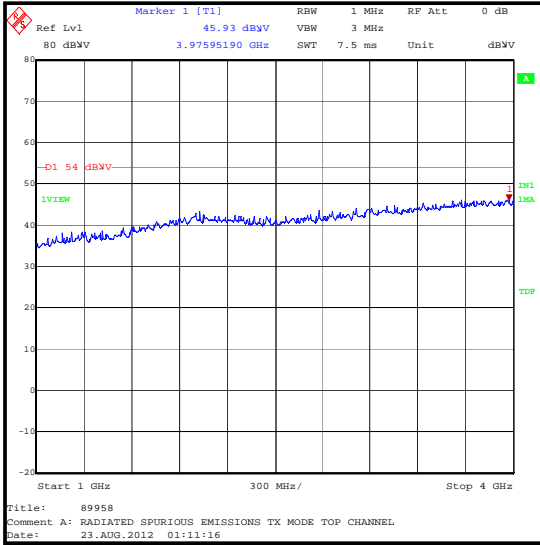
**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss
2. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
3. The emission shown at 5825 MHz on the 4 GHz to 6 GHz plot is the EUT fundamental.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

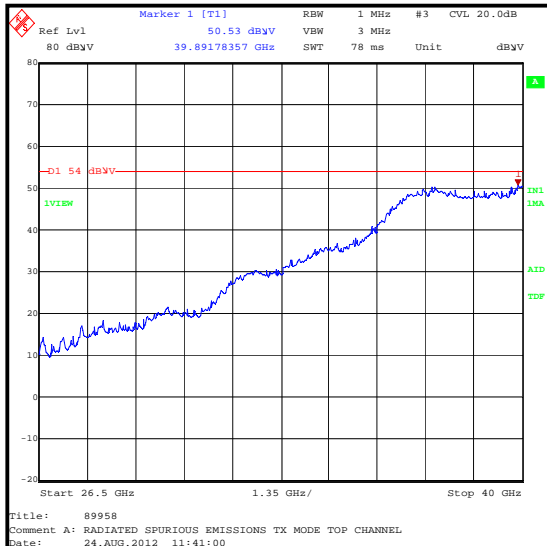
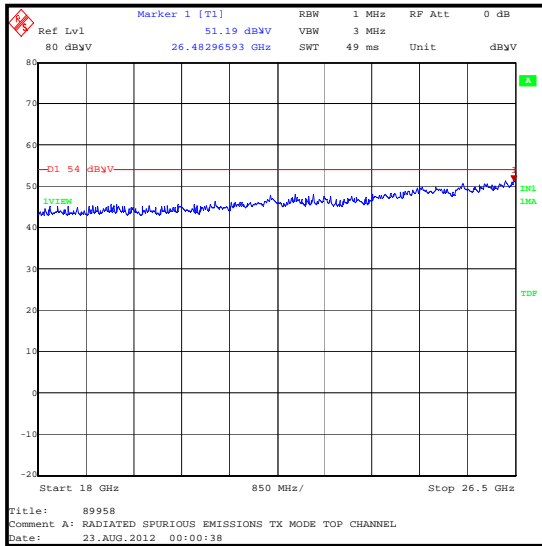
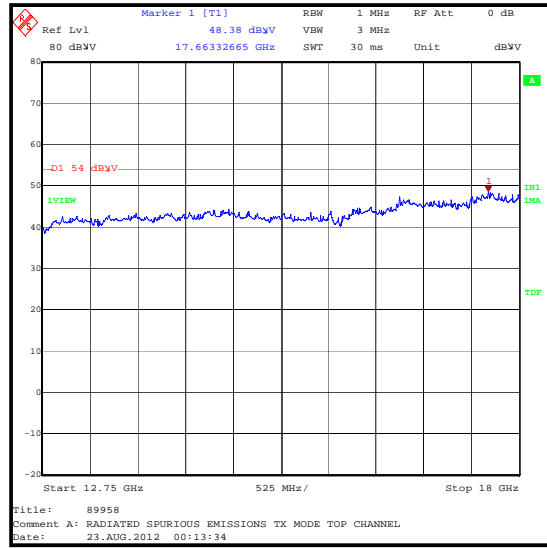
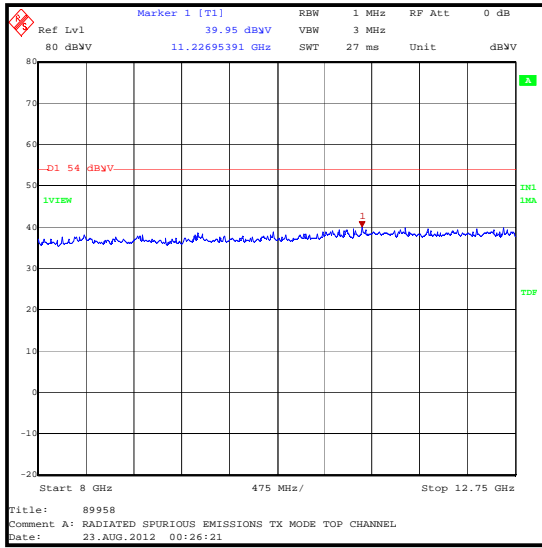
**Results: 802.11n / 20 MHz / 6.5 Mbps / MCS0**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
26482.966	Vertical	51.2	54.0	2.8	Complied

**Transmitter Radiated Emissions (continued)**



### Transmitter Radiated Emissions (continued)



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

**Transmitter Radiated Emissions (continued)****Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0002	3m RSE Chamber	N/A	09 Oct 2012	12
M1124	Test Receiver	ESIB 26	14 Aug 2013	12
A1396	Attenuator	6810.17.B	06 Jul 2013	12
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A1818	1-18GHz Horn Antenna	3115	09 Oct 2012	12
A253	WG 12 Microwave Horn	12240-20	09 Oct 2012	12
A254	WG 14 Microwave Horn	14240-20	09 Oct 2012	12
A255	WG 16 Microwave Horn	16240-20	09 Oct 2012	12
A256	WG 18 Microwave Horn	18240-20	09 Oct 2012	12
A436	WG 20 Microwave Horn	20240-20	09 Oct 2012	12
A203	WG 22 Microwave Horn	22240-20	11 May 2013	36
M1390	26.5 GHz to 40 GHz Harmonic Mixer	WHMP 28	Calibrated before use	-
A1785	26.5 GHz to 40 GHz Pre-amplifier	FLNA-28-30	Calibrated before use	-
A366	Isolator	FRR-400	Calibrated before use	-
S0537	DC Power Supply Unit	EL302D	Calibrate not required	-
M1269	Multimeter	179	30 Jul 2013	12

**5.2.9. Transmitter Band Edge Radiated Emissions****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	24 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Industry Canada Reference:</b>	RSS-Gen 4.9, RSS-210 A8.5
<b>Test Method Used:</b>	FCC KDB 558074 D01 Section 5.4 ANSI C63.10 Sections 6.9.2

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	45

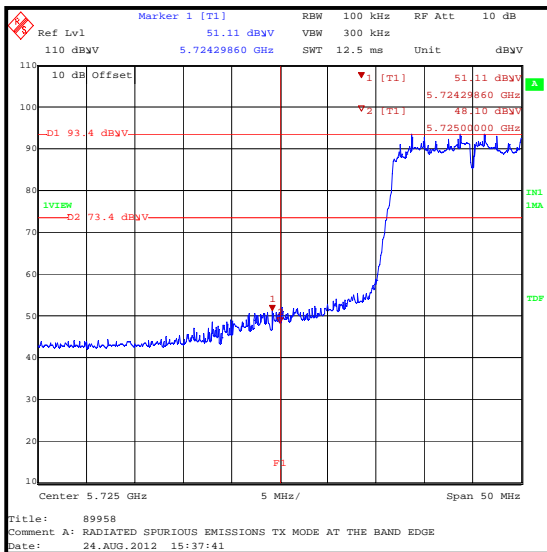
**Note(s):**

1. The EUT was set to transmit on the bottom channel when performing measurements at the lower band edge and the top channel when performing measurements at the upper band edge.
2. Non-restricted bands are adjacent to the upper and lower band edges and the -20 dBc limit applies.
3. The final measured value for the given emissions in the result tables incorporates the calibrated antenna factor and cable loss.
4. Measurements were performed on the worst case data rates declared by the customer.
  - o 802.11a: 6 Mbps.
  - o 802.11n: 6.5 Mbps / MCS0

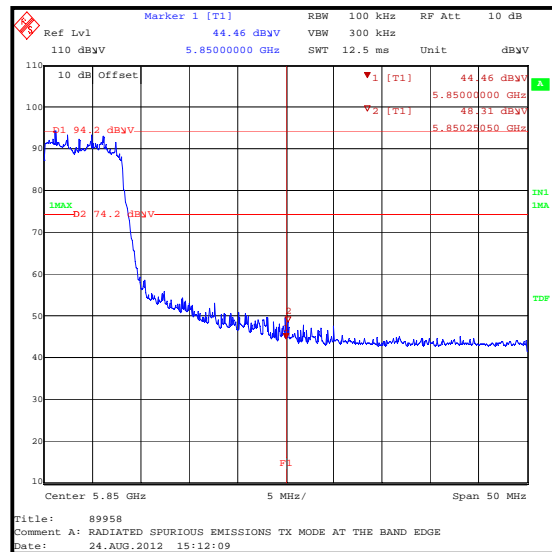
**Transmitter Band Edge Radiated Emissions (continued)**

**Results: 802.11a / 20 MHz / 6 Mbps / BPSK / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
5724.299	51.1	73.4	22.3	Complied
5725	48.1	73.4	25.3	Complied
5850	44.5	74.2	29.7	Complied
5850.251	48.3	74.2	25.9	Complied



**Lower Band Edge Peak Measurement**

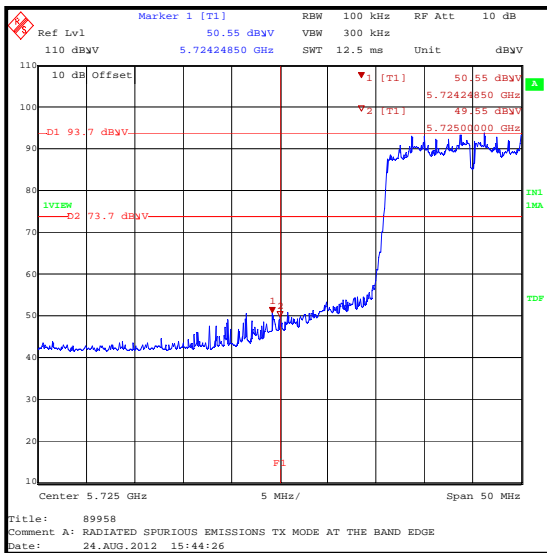


**Upper Band Edge Peak Measurement**

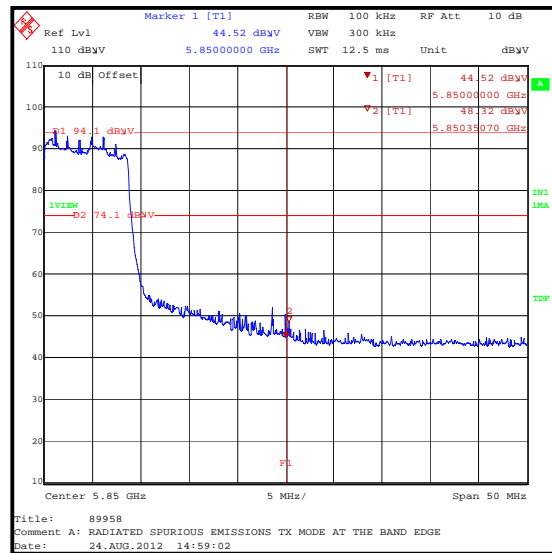
**Transmitter Band Edge Radiated Emissions (continued)**

**Results: 802.11n / 20 MHz / 6.5 Mbps / MCS0 / BPSK / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
5724.249	50.6	73.7	23.1	Complied
5725	49.6	73.7	24.1	Complied
5850	44.5	74.1	29.6	Complied
5850.350	48.3	74.1	25.8	Complied



**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**

**Transmitter Band Edge Radiated Emissions (continued)****Test Equipment Used:**

<b>RFI ID</b>	<b>Instrument Description</b>	<b>Model Number</b>	<b>Calibration Due</b>	<b>Calibration Interval (Months)</b>
K0002	3m RSE Chamber	N/A	09 Oct 2012	12
M1124	Test Receiver	ESIB 26	14 Aug 2013	12
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A253	WG 12 Microwave Horn	12240-20	09 Oct 2012	12
A1396	Attenuator	6810.17.B	06 Jul 2013	12

## **6. Measurement Uncertainty**

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.25 dB
Conducted Maximum Peak Output Power	5725 MHz to 5850 MHz	95%	±0.28 dB
Spectral Power Density	5725 MHz to 5850 MHz	95%	±2.94 dB
6 dB Bandwidth	5725 MHz to 5850 MHz	95%	±0.92 ppm
Occupied Bandwidth	5725 MHz to 5850 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 40 GHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

## **7. Report Revision History**

<b>Version Number</b>	<b>Revision Details</b>		
	<b>Page No(s)</b>	<b>Clause</b>	<b>Details</b>
1.0	-	-	Initial Version
2.0	-	-	Added setup photos and power versus frequency table